

**QUALITY CONTROL REPORTS FOR
SEMI DENSE BITUMINOUS CONCRETE**



CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

An ISO 9001:2008 Certified Company

NABL - Accredited Laboratory as per ISO / IEC-17025 : 2005



Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC(QB)/2014-15

14.07.2014

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

CLIENT	:	Asst. Executive Engineer, Kodigehalli Sub Division, BBMP, Bangalore.
AGENCY	:	Technical Manager, KRIDL, Bangalore.
NAME OF THE WORK	:	Improvements of Roads (UGD Laying Roads) and Drains in Sandyagappa Reddy Layout, Mariyannapalya in Ward No.07 Byatarayanapura, BBMP, Bangalore.
REFERENCE	:	AEE/(KOD.SUB.DIV)/ /2014-15 Dated: 06.06.2014
SOURCE OF LOCATION	:	Hot mix Plant, Bangalore
DATE OF TESTING	:	14.07.2014



The results of the tests conducted on the bitumen sample.

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 °C, 1/10 mm	IS :1203 -1978 (RA-2009)	86	80 to 100
2	Softening point, °C	IS :1205 -1978 (RA-2009)	45	Min. 40
3	Ductility at 27°C, cm	IS :1208 -1978 (RA-2009)	100 >	Min. 75
4	Flash Point, °C	IS :1209 -1978 (RA-2009)	296	Min. 220



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Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC/AIV/2014-15

14.07.2014

Aggregate Impact Value

IS: 2386 Part IV

Client	Asst. Executive Engineer, Kodigehalli Sub Division, BBMP, Bangalore.
Agency	Technical Manager, KRIDL, Bangalore.
Name of the Work	Improvements of Roads (UGD Laying Roads) and Drains in Sandiyagappa Reddy Layout, Mariyannapalya in Ward No.07 Byatarayanapura, BBMP, Bangalore.
Reference	AEE/(KOD.SUB.DIV)/ /2014-15 Dated: 06.06.2014
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	14.07.2014



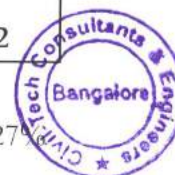
Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	389	392	21.12
2	Weight of aggregate passing 2.36 mm sieve after the test = W_2 g	80	85	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	309	307	
4	Aggregate Impact value = percent fines $100 * (W_2/W_1) \%$	20.57	21.68	

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27

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Aggregate Impact Value

IS: 2386 Part IV

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Reference	AEE/(KOD.SUB.DIV)/ /2014-15 Dated: 06.06.2014
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	14.07.2014



Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	390	392	22.89
2	Weight of aggregate passing 2.36 mm sieve after the test = W_2 g	89	90	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	301	302	
4	Aggregate Impact value = percent fines $100 * (W_2/W_1) \%$	22.82	22.96	

Comments:

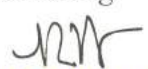
→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 2

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Aggregate Impact Value

IS: 2386 Part IV

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Reference	AEE/(KOD.SUB.DIV)/ /2014-15 Dated: 06.06.2014
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	14.07.2014



Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	386	388	22.09
2	Weight of aggregate passing 2.36 mm sieve after the test = W_2 g	85	86	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	301	302	
4	Aggregate Impact value = percent fines $100 * (W_2/W_1)\%$	22.02	22.16	

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 22.

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Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC/Shape_T/2014-15

: 14.07.2014

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	: Asst. Executive Engineer, Kodigehalli Sub Division, BBMP, Bangalore.
Agency	: Technical Manager, KRIDL, Bangalore.
Name of Work	: Improvements of Roads (UGD Laying Roads) and Drains in Sandiyagappa Reddy Layout, Mariyannapalya in Ward No.07 Byatarayanapura, BBMP, Bangalore.
Reference	: AEE/(KOD.SUB.DIV)/ /2014-15 Dated: 06.06.2014
Technical Reference	: IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	: Semi Dense Bituminous Concrete
Date of Testing	: 14.07.2014



Result : Flakiness Index = 11.36%

Elongation Index = 13.10%

Result : Combined Flakiness & Elongation index 24.46%

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Reference	: AEE/(KOD.SUB.DIV)/ /2014-15 Dated: 06.06.2014
Technical Reference	: IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	: Semi Dense Bituminous Concrete
Date of Testing	: 14.07.2014



Result : Flakiness Index = 11.85%

Elongation Index = 13.26%

Result : Combined Flakiness & Elongation index 25.11%

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

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Reference	: AEE/(KOD.SUB.DIV)/ /2014-15 Dated: 06.06.2014
Technical Reference	: IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	: Semi Dense Bituminous Concrete
Date of Testing	: 14.07.2014



Result : Flakiness Index = 12.35%

Elongation Index = 13.63%

Result : Combined Flakiness & Elongation index 25.98%

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC/Stripping/2014-15

16.07.2014

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Client	Asst. Executive Engineer, Kodigehalli Sub Division, BBMP, Bangalore.
Agency	Technical Manager, KRIDL, Bangalore.
Name of the work	Improvements of Roads (UGD Laying Roads) and Drains in Sandyagappa Reddy Layout, Mariyannapalya in Ward No.07 Byatarayanapura, BBMP,
Reference	AEE/(KOD.SUB.DIV)/ /2014-15 Dated: 06.06.2014
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	16.07.2014



Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.1	3.20	96.80
2	3.2		
3	3.3		

Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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16.07.2014

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Client	Asst. Executive Engineer, Kodigehalli Sub Division, BBMP, Bangalore.
Agency	Technical Manager, KRIDL, Bangalore.
Name of the Work	Improvements of Roads (UGD Laying Roads) and Drains in Sandiyagappa Reddy Layout, Mariyannapalya in Ward No.07 Byatarayanapura, BBMP, Bangalore.
Reference	AEE/(KOD.SUB.DIV)/ /2014-15 Dated: 06.06.2014
Type of Mix	Semi Dense Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	16.07.2014



Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	$W_1 g$	2024	2025	2022	
2	Weight of basket suspended in water	$W_2 g$	755	2020	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s g$	1269	1270	1267	
4	Weight of saturated surface dry aggregate in air	$W_3 g$	2015	2016	2015	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_s) g$	746	746	748	
6	Weight of oven dried aggregate	$W_4 g$	1999	1998	2012	
7	Specific Gravity	$W_4 / (W_3 - W_s)$	2.680	2.678	2.690	2.683
8	Apparent Specific gravity	$W_4 / (W_4 - W_s)$	2.738	2.745	2.701	2.728
9	Water Absorption	$((W_3 - W_4) * 100) / W_4$	0.80%	0.90%	0.15%	0.62%

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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16.07.2014

BITUMEN CONTENT DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

AS per IRC:SP:-1984

CLIENT	Asst. Executive Engineer, Kodigehalli Sub Division, BBMP, Bangalore.
AGENCY	Technical Manager, KRIDL, Bangalore.
NAME OF THE WORK	Improvements of Roads (UGD Laying Roads) and Drains in Sandiyagappa Reddy Layout, Mariyannapalya in Ward No.07 Byatarayanapura, BBMP, Bangalore.
REFERENCE	AEE/(KOD.SUB.DIV)/ /2014-15 Dated: 06.06.2014
SAMPLE I/D	Roads in Sandiyagappa Layout in Ward No.07.
DATE OF TESTING	16.07.2014



BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	475	474
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	25	26.00
7. Bitumen content in %	5.00	5.20
8. Average	5.10	

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BITUMEN CONTENT GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

As per IS2386 and IRC:SP:11-1984

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SAMPLE I/D	Roads in Sandyagappa Layout in Ward No.07.
DATE OF TESTING	16.07.2014



GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	26.31	5.54	5.54	94.46	90-100
4.75	256.4	53.98	59.52	40.48	35-51
2.36	56.35	11.86	71.38	28.62	24-39
1.18	41.32	8.70	80.08	19.92	15-30
0.3	33.26	7.00	87.08	12.92	9-19
0.075	31.25	6.58	93.66	6.34	3-8

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	30.26	6.38	6.38	93.62	90-100
4.75	264.5	55.80	62.19	37.81	35-51
2.36	60.32	12.73	74.91	25.09	24-39
1.18	35.26	7.44	82.35	17.65	15-30
0.3	30.21	6.37	88.72	11.28	9-19
0.075	24.36	5.14	93.86	6.14	3-8

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Aggregate Gradation Test

IS : 2386 Part I

Client	Asst. Executive Engineer, Kodigehalli Sub Division, BBMP, Bangalore.
Agency	Technical Manager, KRIDL, Bangalore.
Name of the Work	Improvements of Roads (UGD Laying Roads) and Drains in Sandyagappa Reddy Layout, Mariyannapalya in Ward No.07 Byatarayanapura, BBMP, Bangalore.
Reference	AEE/(KOD.SUB.DIV)/ /2014-15 Dated: 06.06.2014
Sample I / D	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete (SDBC)
Date of Testing	16.07.2014

Total Weight of Sample: 5250 gm

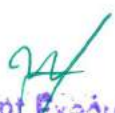
SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	410	7.8	7.81	92.19	90-100	
4.75	2650	50.5	58.29	41.71	35-51	
2.36	615	11.7	70.00	30.00	24-39	
1.18	480	9.1	79.14	20.86	15-30	
0.3	385	7.3	86.48	13.52	9-19	
0.075	310	5.9	92.38	7.62	3-8	

Total Weight of Sample: 5350 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	300	5.6	5.61	94.39	90-100	
4.75	2650	49.5	55.14	44.86	35-51	
2.36	820	15.3	70.47	29.53	24-39	
1.18	430	8.0	78.50	21.50	15-30	
0.3	480	9.0	87.48	12.52	9-19	
0.075	425	7.9	95.42	4.58	3-8	

Note:

- 1 This test report should not be reproduced except in full, without written approval of the laboratory.
- 2 The results indicated above are based on the tests carried out on the samples received in the laboratory.
- 3 Any Query regarding the report must be reported within 15 days from the date of testing.


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Job No.: CTCE/BBMP/W.No.07/KRIDL/SDBC/Stability/2014-15

16.07.2014

TEST REPORT ON STABILITY OF MIX

Client	: Asst. Executive Engineer, Kodigehalli Sub Division, BBMP, Bangalore.
Agency	: Technical Manager, KRIDL, Bangalore.
Name of the Work	: Improvements of Roads (UGD Laying Roads) and Drains in Sandyagappa Reddy Layout, Mariyannapalya in Ward No.07 Byatarayanapura, BBMP, Bangalore.
Reference	: AEE/(KOD.SUB.DIV)/ /2014-15 Dated: 06.06.2014
Source of location	: Hot mix Plant, Bangalore
Type of Mix	: Bituminous Concrete
Date of Testing	: 16.07.2014



The results of the tests conducted on the bituminous concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshal Stability, Kn	9.85	9.05	8.2 Kn (min)
2	Marshal flow, mm	2.90	3.15	2 - 4
3	Percent air voids in Mineral Aggregate	4.20	4.10	3 - 5
4	Voids in Compacted Mix	13.20	14.35	13 - 15
5	Percent Voids filled with Bitumen	66.85	67.20	65 - 78
6	Density, g/cc	2.27	2.28	--

Note:

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